BERKELEY LAB
Lawrence Berkeley National Laboratory

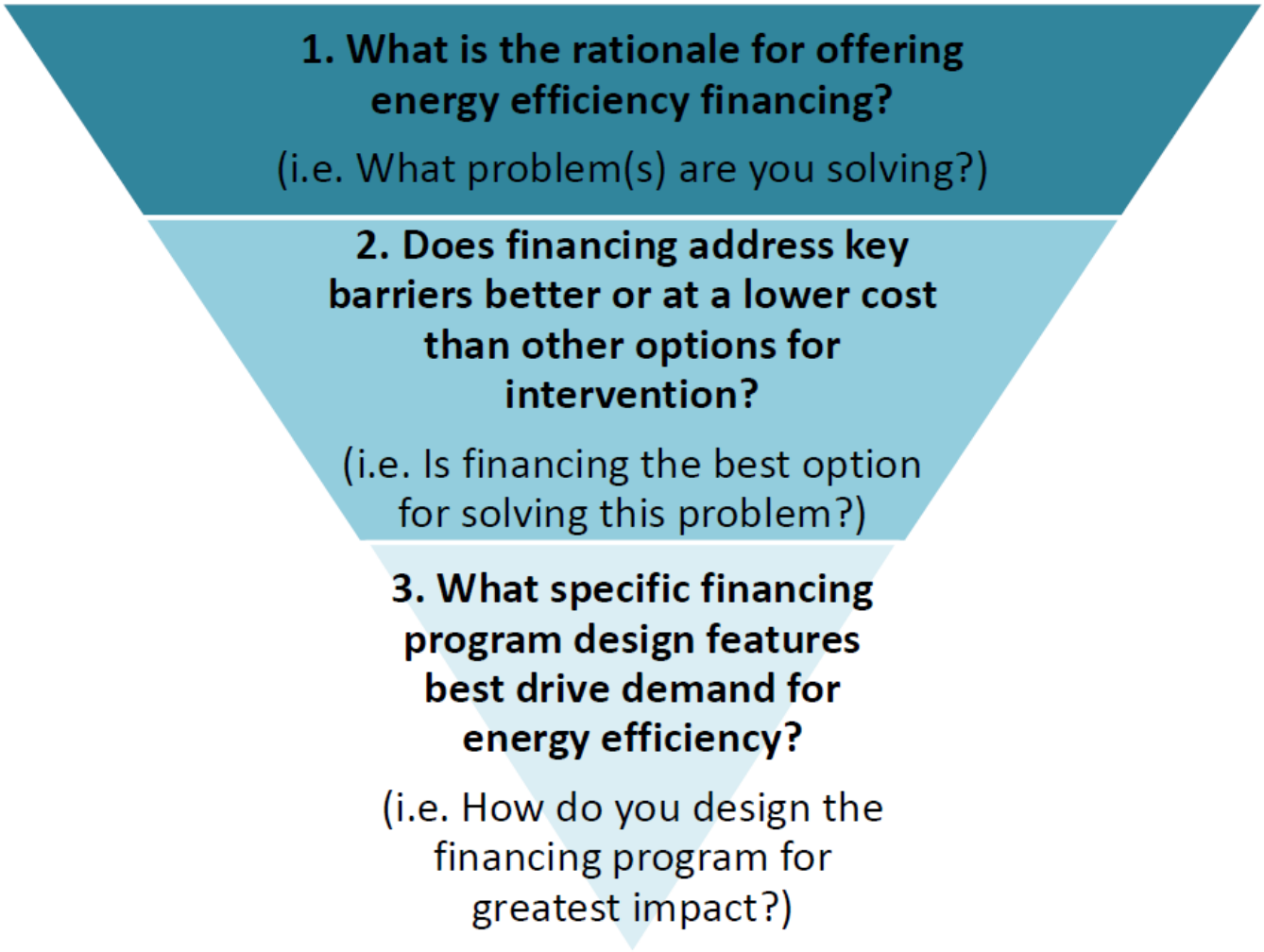
Environmental Energy Technologies Division Lawrence Berkeley National Laboratory

Getting the Most Bang for the Buck:
Exploring the Rationales and Design Options for EE Financing Programs

Merrian Borgeson, Charles Goldman, Annika Todd
& Mark Zimring
Lawrence Berkeley National Laboratory

Report Overview Webcast
December 2013

Research Questions



Report Objectives

- Articulate the rationales for offering EE financing programs
- Highlight key policy and program design questions for which we need better answers
- Offer guidance to EE program administrators on how today's financing programs can be designed and evaluated to resolve key uncertainties and assess their efficacy

What is a financing program?

We describe “offering financing programs” in the broadest sense – this may take the form of:

- Direct provision of public or ratepayer capital
- Direct or indirect support for private sector financial products (e.g., credit enhancement, co-marketing, customer intake)
- Enabling or offering of novel financial products (e.g., on-bill financing)
- Or some combination of these

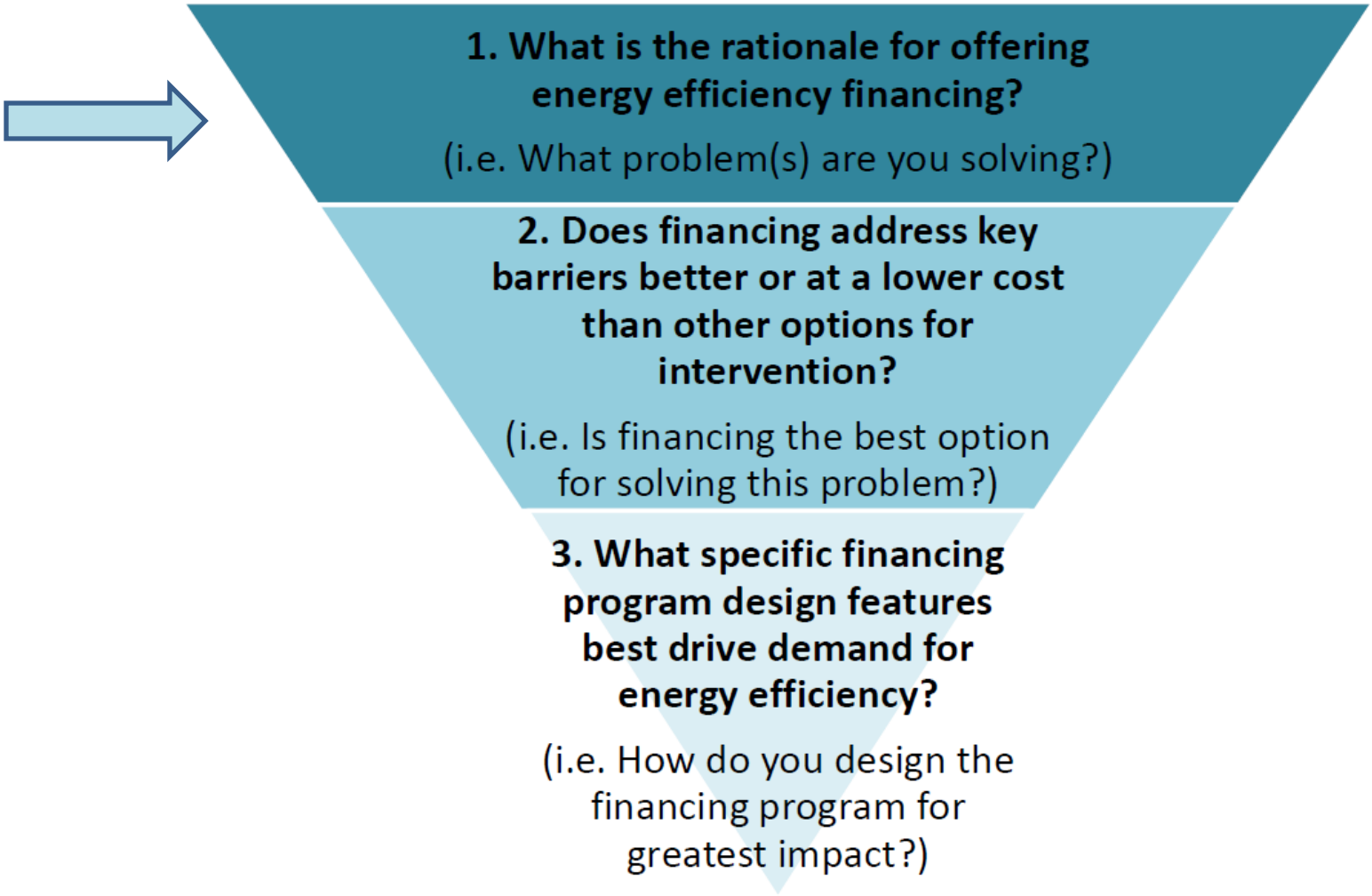
Background and Context

- Financing has historically been a small part of the portfolio of EE offerings
- Some policymakers and program administrators considering shifts to traditional mix of program offerings to rely more heavily on financing
- In a world of limited program budgets, these shifts may require difficult choices between allocating funds to financing or to other program elements (e.g. rebates, technical assistance)
- If financing increases in prominence, useful to conduct more rigorous assessments of the ability of financing to overcome barriers to EE adoption and deliver cost-effective incremental energy savings.

Presentation Overview

- Three Levels of Key Questions
  - What Problems Are You Solving?
  - Is Financing the Best Option?
  - How Do We Maximize Financing Program Impacts?
- Approaches to Evaluating Key Questions
- Conclusions & Next Steps

Research Questions



What Problem(s) Are You Solving?

- The rationale(s) for offering financing programs must be clearly established so that we can recognize “success” if it occurs
- Several cases can be made that today’s EE financing market warrants tax payer or utility bill payer intervention:
    1. Larger consumer cost contributions are needed to increase the leverage of limited tax payer or utility bill payer funding.
    2. More information is needed before private markets can provide appropriate financial products;
    3. Financial product standardization and aggregation are needed for the private markets to deliver attractive capital;
    4. New financial products are needed to overcome barriers specific to energy efficiency, and;
    5. Some consumer market segments are under-served by private markets;

The Appeal of Financing

Larger consumer cost contributions can increase the leverage of limited tax payer or utility bill payer funding.

- Many state policymakers and utility regulators have established aggressive EE savings targets
- Tax payer and utility bill payer funding is a small fraction of total investment needed to achieve these targets
- Desire to encourage substantial cost contributions by participating consumers in order to stretch the impacts of limited tax payer and utility bill payer funds farther

CA Building Sector*	Investment Needed	Program Funding
Residential	At least $50 billion	~$3 billion (over 10 yrs)
Commercial	At least $20 billion	~$2 billion (over 10 yrs)

* Estimates based on Harcourt, Brown & Carey's "Energy Efficiency Financing in CA: Needs & Gaps"

Will Financing Increase Leverage?

Program Incentive	Leverage Potential
25% Rebate	4:1
50% Rebate	2:1
5% LLR	20:1
10% LLR	10:1

- But, financing can only deliver on this leverage potential if it drives (or enables existing) consumer demand for EE
- For many consumers, lack of demand for EE—not access to attractive capital to pay for it—may be the primary challenge

Key Questions:

✓ Is financing an effective tool for **driving consumer EE adoption**? For which consumers and at what cost?

✓ What other strategies should be combined with financing to maximally increase demand at the lowest possible cost?

Are EE Financial Products Mispriced?

More information is needed for private financing markets to take over

- While many financial tools exist to enable consumers to borrow funds to pay for EE improvements, the terms (e.g., interest rate, length) and underwriting criteria of these products may not reflect EE's benefits
- Energy savings reduce participant utility bills, leaving consumers with more money to make debt repayment
- Lower defaults may yield some combination of reduced interest rates, longer terms and less restrictive underwriting
- More accessible and attractive financial products might enhance project cash flows and support broader EE adoption

Will Better Data on Financing Programs Help?

- Today, FIs lack access to adequate data to assess and price the potentially unique risk profile of efficiency projects
- Financing programs could be used as temporary interventions to deliver accessible, attractive financing products while developing better data

Key Questions

✓ Does financing for energy efficiency have lower consumer default rates and delinquencies than financing for other property improvements?

✓ Is the performance of EE financing strong enough to warrant substantial improvements to the interest rates, lengths and/or underwriting for private financial products?

✓ What data are required to enable financial institutions to obtain sufficient evidence to improve the terms of their current product offerings? How long will it take to build this data set?,

Can Better Data Transform Financing Markets?

Financial product standardization and aggregation are needed for the private markets to deliver attractive capital

- Today, EE financing markets are characterized by low volume, lack of product standardization and the absence of vehicles to aggregate financing pools for re-sale. A few efficiency programs have faced capital constraints due to high financing volume, but most programs and their financial partners have substantial outstanding lending capacity.
- If financial product terms were standardized across programs—would help to aggregate volume and facilitate secondary markets transactions.
- Secondary markets may deliver large pools of low-cost institutional investor capital for EE financing

Key Question

✓ Does sufficient consumer demand exist today to warrant program investments in aggregation and securitization infrastructure, or should interventions simply focus on increasing the volume of standardized loans?

Are New Financial Products Necessary?

New financial products are needed to overcome barriers specific to energy efficiency;

- High up-front costs are one of several barriers to EE adoption
- New financial products (e.g., PACE, OBF/OBR) may expand access to attractive capital AND overcome other barriers such as split incentives and the balance sheet treatment of EE financing

Are New Financial Products Necessary?

Financial Product	Security	Overcomes Split Incentives?	Overcomes Long Project Paybacks	Overcomes Balance Sheet Barriers?
Unsecured Loan	None	No	No	No
Mortgage	Lien on consumer's property	No	No	No
PACE	Super-senior lien on consumer's property	Maybe	Maybe	Maybe.
OBF/OBR	Tariff on utility meter	Maybe	Maybe	Maybe

Key Questions

- ✓ Are new financing products more effective in overcoming barriers to EE adoption than traditional financing products?
- ✓ Do specific features (e.g., threat of utilities disconnection, alternative underwriting) lead to lower consumer default rates and delinquencies or higher participation rates?

Is Long-Term Support Needed for Some Consumers?

Some consumer market segments are under-served by private markets

- Some consumers (e.g., small businesses, middle income households, affordable multi-family properties) may be underserved by financial markets
- More information may not be sufficient to make financing more accessible to these consumers (i.e., default rates may not be low enough to alter the costs and risks of serving these consumers)
- Tax payer and bill payer monies target a range of system and public benefits that may lead to a different assessment of risk and return than private capital providers

Key Questions

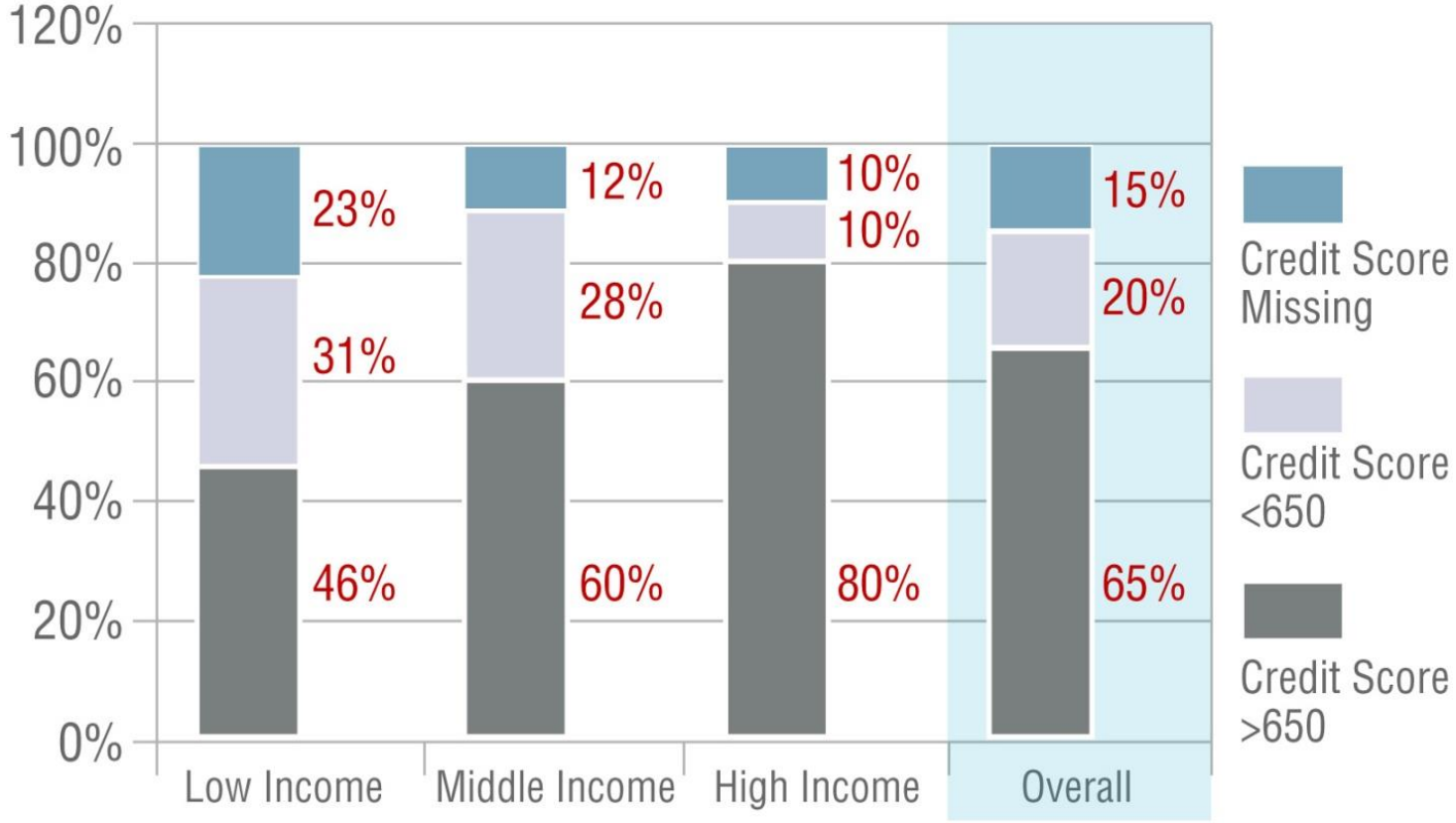
✓ What market segments are currently underserved by capital markets and why?

✓ Which market segments are likely to continue to be underserved even if the problems underlying other rationales are addressed?

✓ Can attractive capital be extended to underserved consumers at "acceptable" risk to those consumers and in a way that delivers low-cost energy savings to tax payers and utility bill payers?

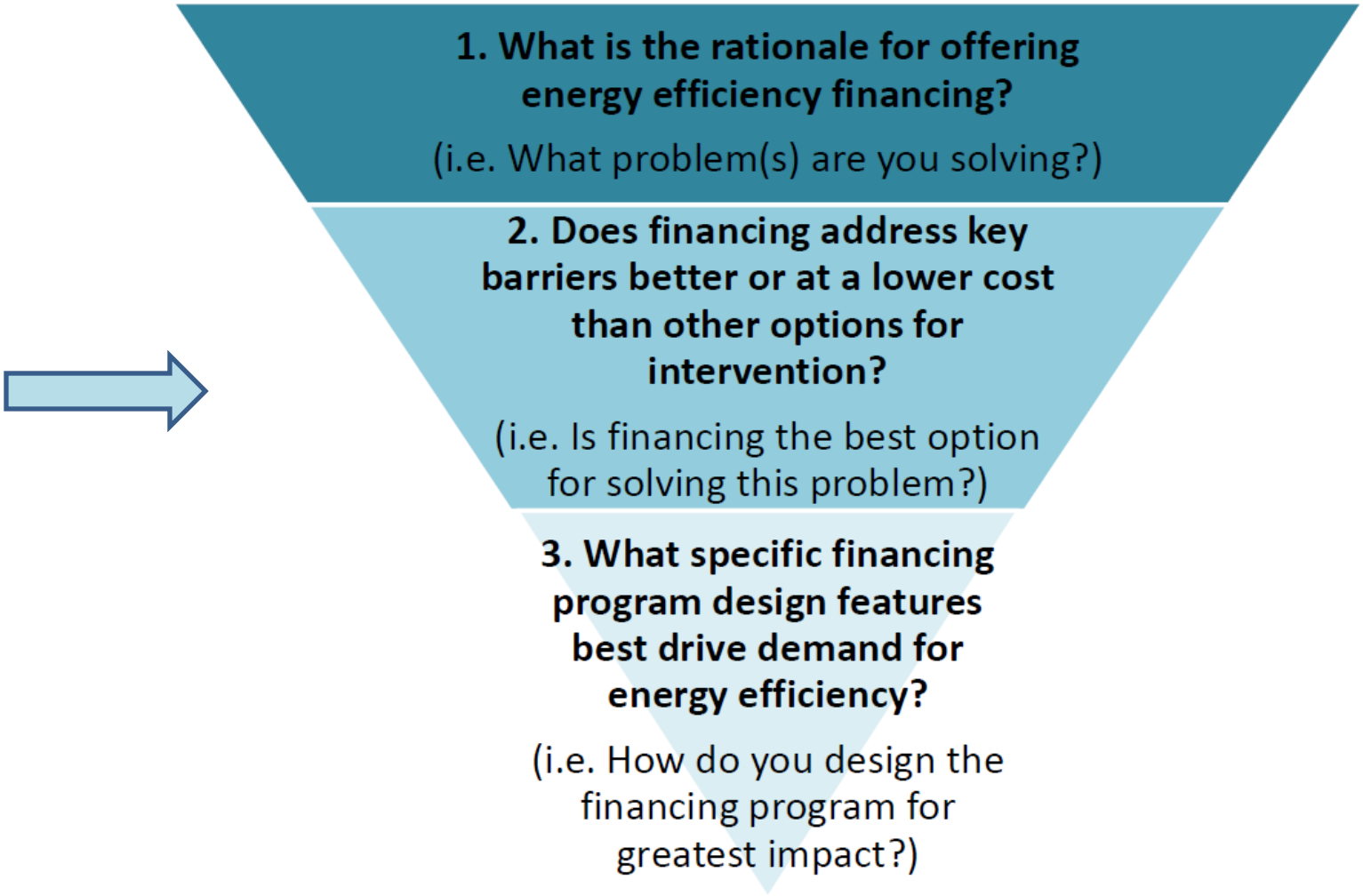
Example: Middle Income Households

Credit scores are a key metric for lenders in evaluating creditworthiness; middle income households are likely to have lower credit scores than their higher income peers.



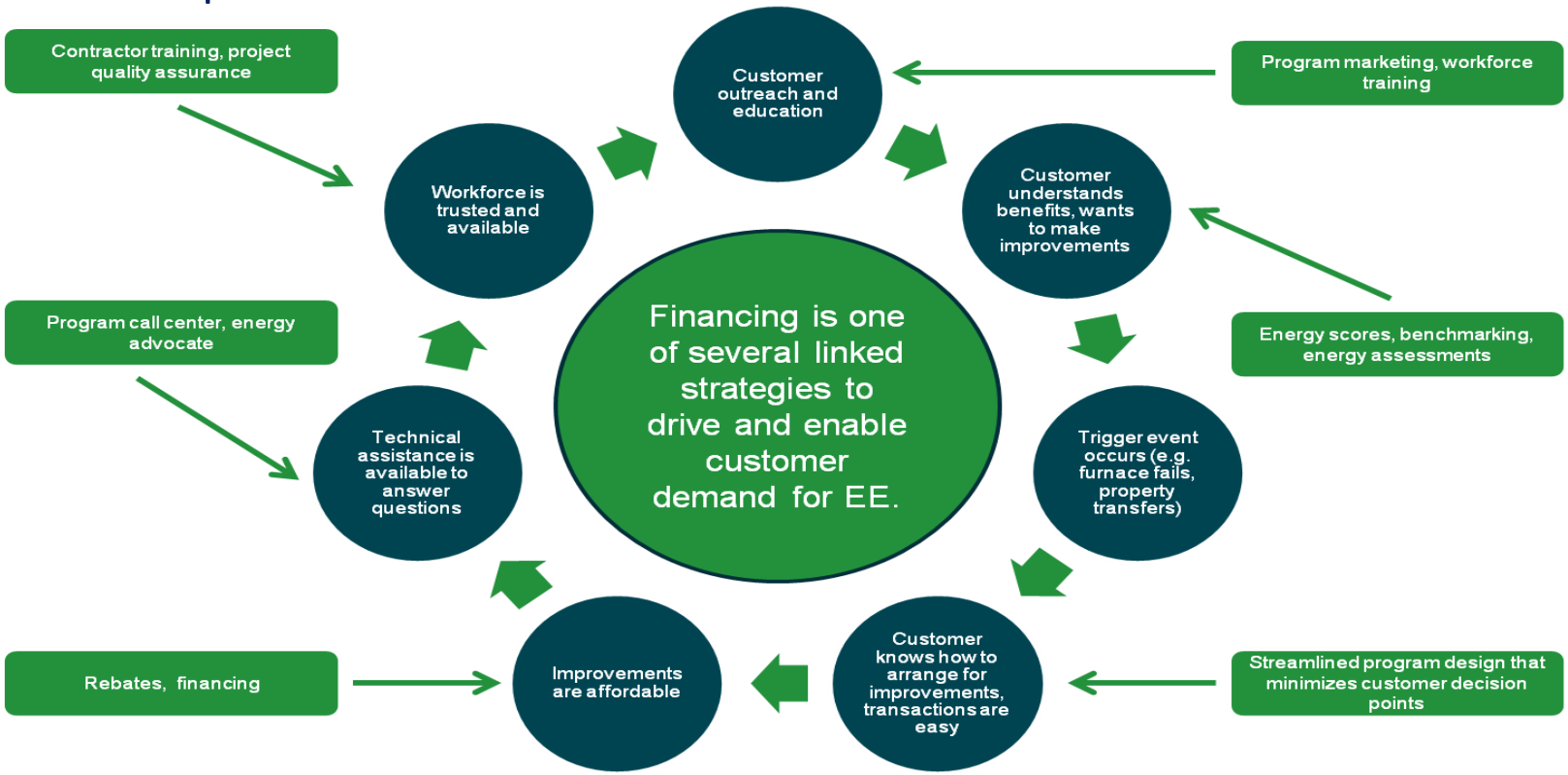
Source: Due to data limitations, for the purposes of the credit score analysis, we use household income of $30,000 to $70,000 to define middle income. Credit score data from Energy Programs Consortium; based on analysis of TransUnion credit data from Intellidyn.

Research Questions



High First Costs Are Just One Barrier to EE Adoption

- The up-front cost of EE is just one of many barriers, and often times not the most important one
- Financing is part of a holistic suite of strategies targeting the range of barriers to EE adoption



Is Financing More Effective Than Other Strategies?

- Developing & supporting financing programs can have substantial costs. Important to assess whether financing interventions can achieve program goals at the same—or lower—costs than other strategies, and for whom

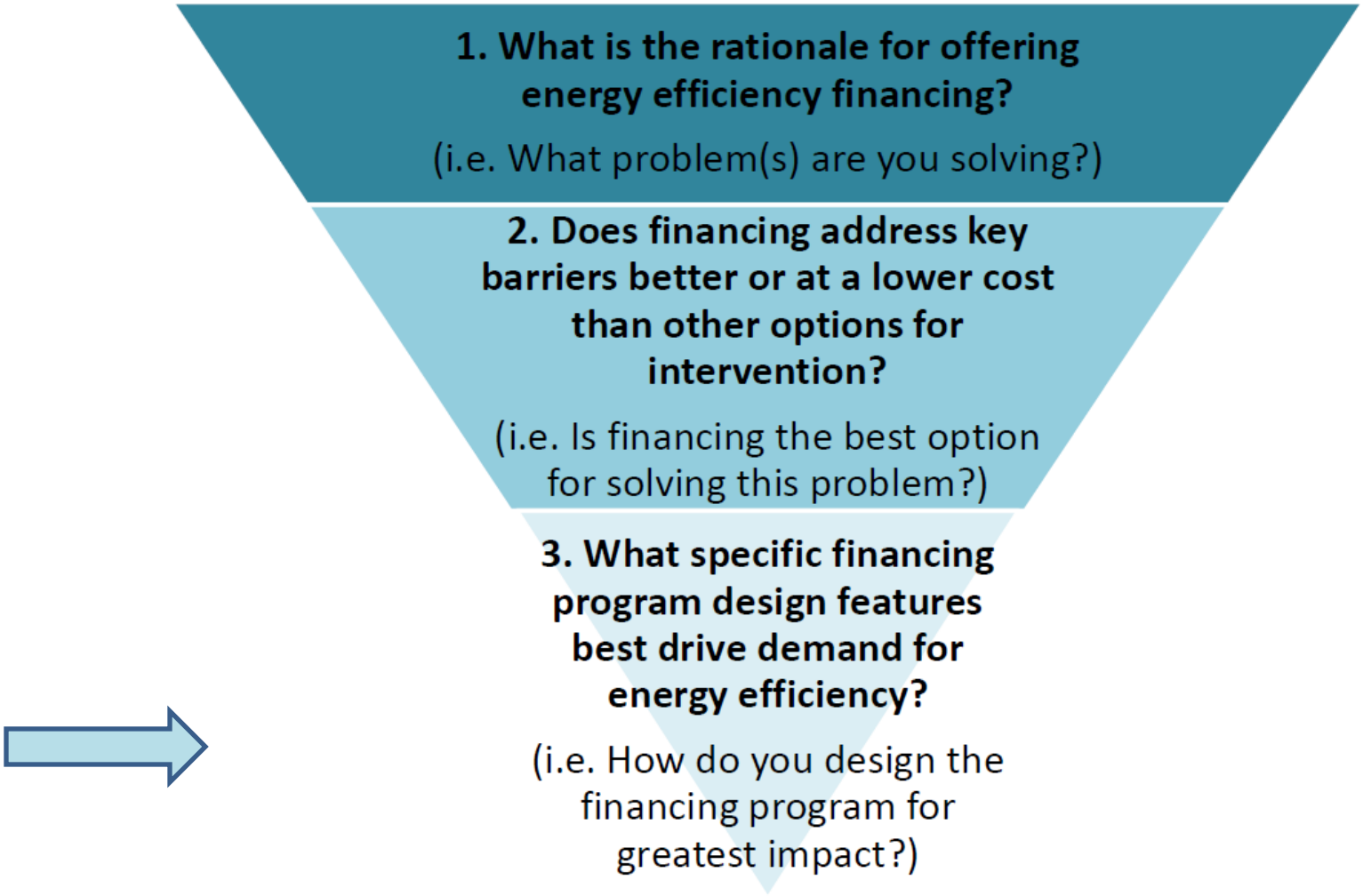
Illustrative questions

✓ Are consumers as likely to adopt targeted EE improvements if offered financing rather than rebates (or other support such as TA)?

✓ What impact does program-sponsored financing (rather than rebates or other incentives) have on the likelihood of consumers that *already* have access to capital to adopt targeted EE improvements?

✓ Do projects deliver greater energy savings if program financing is used (or available) compared to rebates (or other strategies)?

Research Questions



Which Financing Program Design Elements Matter?

- A range of program design features (e.g., interest rate, term, repayment mechanism, ease of use) may help to drive consumer EE adoption
- Examining those features that are most costly ($ or political capital) to offer is a good place to start

Key Questions

✓ Do lower interest rates, longer financial product maturities and/or less restrictive underwriting than what is available in private markets increase consumer adoption of targeted EE improvements?

✓ How important is timely and streamlined loan approval to increasing consumer adoption?

✓ Does the ability to repay EE financing on a tax or utility bill increase consumer adoption of EE improvements relative to traditional financial products?

✓ Does expected (or realized) "bill neutrality" increase consumer adoption of targeted EE improvements?

✓ Does automatic or optional transferability of financing payments increase consumer adoption of targeted EE improvements?

Presentation Overview

- Three Levels of Key Questions
  - What Problems Are You Solving?
  - Is Financing the Best Option?
  - How Do We Maximize Financing Program Impacts?
- Approaches to Evaluating Key Questions
- Conclusions & Next Steps

Answering the Big Questions

- How can we ensure that we are implementing the most cost effective programs?
  - Administrators will need to go beyond asking participants if they want financing or needed it to complete a project
  - We need to test different program offerings and observe who participates, who does not and at what cost

- The report describes 3 broad categories of strategies for testing program options:

1. Qualitative Market Research
2. Analysis of Standardized Financing Program Data
3. Experimental and Quasi-Experimental Design

Qualitative Market Research

Best Suited For: Getting an idea for how potential market participants and consumers think about EE financing

Example: *Secondary Markets Development*

- A number of program administrators are using public entities to aggregate EE financial products and facilitate their sale to secondary investors
- Whether these interventions are the best use of program monies is a question worthy of qualitative consideration that does not lend itself well to rigorous quantitative evaluation
- One approach to resolving uncertainty about the value of this approach may be to look to the past experiences of other emerging financial markets (e.g., time shares) for evidence on how EE finance markets might evolve and to make strategic decisions based on these other markets

Analysis of Standardized Financing Program Data

Best Suited For: Answering broad questions whose answers are unlikely to vary dramatically across small differences in specific financing program design elements or financial product features.

Example: *EE Financing Default Rates*

Question: Do consumers default at lower rates for EE financing than for other financial products?

- Collecting and analyzing data from EE financing programs can help to answer this question
- However,
  - No single program is large enough
  - Financial institutions claim that they lack adequate data. Standardizing data collection and analysis protocols across these programs is a powerful tool for aggregating sufficiently large pools to bridge this information gap

Experimental & Quasi-Experimental Design

- **Best Suited For:** When administrators and policymakers need to be confident about:
  - Whether financing is a better option than other program strategies
  - What specific financing program design features matter most
- Using qualitative assessments is unlikely to yield answers to many of the program design questions described in this report
- Analyzing standardized data to answer broad questions is unlikely to yield answers to research questions related to the efficacy of specific program design elements or financial product features in driving consumer EE adoption
- Experimental and quasi-experimental design approaches compare two groups of customers, each of which receives a different program design feature or a different program option

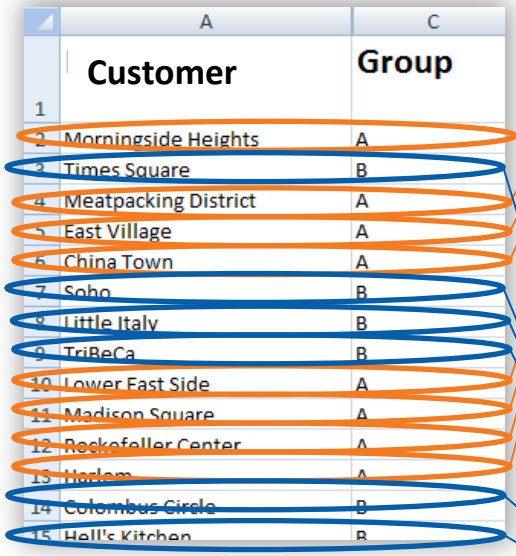
Experimental V. Quasi-Experimental Design

- Experimental vs. Quasi-Experimental Design
  - Experimental design forms two comparable groups through random assignment
    - Delivers the highest degree of confidence that one's results are valid
    - Can validly detect small effects (and large effects)
    - May be harder to implement
  - Quasi-experimental design forms two comparable groups through other methods
    - Lower confidence in the validity of results
    - If the effects are small, conclusions drawn from the results may be invalid. If effects are large, then conclusions are more likely to be valid.
    - May avoid some implementation challenges

Experimental Design Basics

1st ***Randomly*** **assign each household to one of two groups**

2nd ***Count*** **successes in both groups**



	A	C
1	**Customer**	**Group**
2	Morningside Heights	A
3	Times Square	B
4	Meatpacking District	A
5	East Village	A
6	China Town	A
7	Soho	B
8	Little Italy	B
9	TriBeCa	B
10	Lower East Side	A
11	Madison Square	A
12	Rockefeller Center	A
13	Harlem	A
14	Columbus Circle	B
15	Hell's Kitchen	B

Group A

People in group A receive one type of program offer

(e.g., are **offered rebates**)

Group B

People in group A receive one type of program offer

(e.g., are **offered financing**)

Group A

- Number of leads
- Number of conversions

Group B

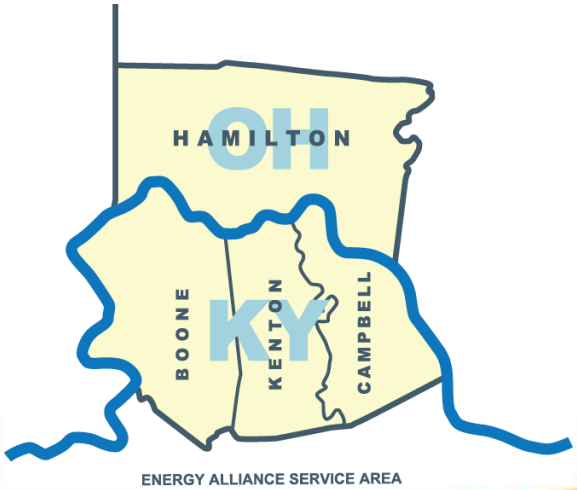
- Number of leads
- Number of conversions

A Real-World Example

GREATER CINCINNATI ENERGY ALLIANCE

- Nonprofit economic development agency
  - Public-Private Partnership
- Energy Efficiency Services
  - Education/Outreach
  - Project Management
  - Financing Solutions
- Market Focus
  - Residential, Commercial, and Nonprofit

BETTER BUILDINGS
U.S. DEPARTMENT OF ENERGY



Transition to Sustainability

- Looking for opportunities to continue to deliver EE programs
- Utilities as source for long-term partnership
  - Duke Energy Ohio delivers electricity and natural gas in local market
- Ohio Energy Efficiency Resource Standard (EERS)
  - 22% by 2025
  - Public Utility Commission of Ohio three year portfolio case approval (Case No. 13-431-EL-POR)

Developing Utility Partnership

- Stress value of program integration, especially financing programs
- Negotiating pilot program to test the joint marketing of program financing
  - Identified test and control counties
  - Use of contractors and other communications tools to market program
  - Looking for increase in number of jobs (rebates) and size of jobs (kWh savings)

Presentation Overview

- Three Levels of Key Questions
  - What Problems Are You Solving?
  - Is Financing the Best Option?
  - How Do We Maximize Financing Program Impacts?
- Approaches to Evaluating Key Questions
- Conclusions & Next Steps

Conclusions and Next Steps

- This report offers a starting place for developing a better understanding of financing's role in driving cost-effective EE adoption
- Administrators and policymakers should consider their target consumers, target EE improvements and local context when choosing those questions that are most important to answer
- Important for administrators to challenge and verify their assumptions before making fundamental shifts in program offerings
- We encourage administrators to consider coordinating their financing evaluation efforts regionally or nationally so that lessons learned can be shared

Questions?

Download The Report Here:

http://financing.lbl.gov

Annika Todd
510-495-2165
atodd@lbl.gov

Charles Goldman
510-486-4637
Cagoldman@lbl.gov

Mark Zimring
510-495-2088
mzimring@lbl.gov